

In re patent application of:
CALDWELL, JR.
Continuation of 09/828,293 filed 04/06/2001
Filed: **HEREWITH**
Serial No. **NOT YET ASSIGNED**

In the claims:

1. (Original) An apparatus for mandrel-assisted resin transfer molding an article comprising:

an outer female mold element having an interior surface associated with a first surface of said article; and

an inner male mold element having an exterior surface associated with a second surface of said article, and being sized to be placed within said outer female mold element, so as to define a mold assembly forming a mold cavity between said interior surface of said outer female mold element and said exterior surface of said inner male mold element, said mold cavity receiving a structural preform to be impregnated with resin, said inner male mold element having a perimeter sidewall that extends a vertical distance alongside, but is spaced apart from, a mutually facing interior sidewall of said outer female mold element, so as to form a generally continuous narrow annular channel between an outer perimeter edge of said inner male mold element and an inner perimeter edge of said outer female mold element, said channel extending to and being contiguous with said mold cavity, to allow venting of air and expansion therethrough of resin that has been introduced into said mold cavity and has impregnated said structural preform therein.

2. (Original) The apparatus according to claim 1, further

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including a plurality of indexing tabs affixed to said inner male mold element, and being configured to engage said outer female mold element so as to accurately dimensionally locate said inner male mold element within the interior volume of said outer female mold element.

3. (Original) The apparatus according to claim 1, further including an auxiliary closure engaging said mold assembly and coupled to a vacuum, which is operative to augment the outflow of resin and removal of air pockets from said mold cavity through said channel.

4. (Original) The apparatus according to claim 3, further including a plurality of indexing tabs affixed to said inner male mold element, and being configured to engage said outer female mold element so as to accurately dimensionally locate said inner male mold element within the interior volume of said outer female mold element.

Please cancel Claims 5-9.

Please add new Claims 10-14.

10. (New) A method of manufacturing an article comprising the steps of:

(a) providing a rigid outer female mold element having an

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interior surface associated with a first surface of said article;

(b) providing a rigid inner male mold element having an exterior surface associated with a second surface of said article, and being sized to be placed within an interior region of said outer female mold element, so as to define a mold assembly-forming and unsealed annular mold cavity between said interior surface of said outer female mold element and said exterior surface of said inner male mold element, said inner male mold element having a perimeter sidewall that is adapted to extend a vertical distance alongside, but spaced apart from, a mutually facing interior sidewall of said outer female mold element when said inner male mold is inserted into said outer female mold, such that said inner mold element is not sealed against said outer female mold element;

(c) placing a structural preform within said interior region of said outer female mold element;

(d) introducing a volume of liquid resin into said interior region of said female mold element, thereby wicking fibers of said structural preform and producing a resin-impregnated preform, said volume of liquid resin being larger than the volume of said annular mold cavity defined between said outer female mold element and said inner mold element when inserted into said outer female mold element;

(e) inserting said inner male mold element within said interior region of said outer female mold element, and performing only mandrel-based compression of said inner male mold element

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against said resin-impregnated preform produced at said interior region of said female mold element in step (d), while spacing said inner male mold element apart from said outer female mold element by a prescribed spatial offset that forms geometry parameters of said unsealed annular mold cavity, as well as a generally continuous narrow annular channel that is contiguous with said unsealed mold cavity, and through which air is vented and into which resin introduced in step (d) is allowed to expand from said annular mold cavity, as said inner male mold element is compressed against said liquid resin; and

(f) after curing of said resin, removing said mold assembly to produce a resin transfer molded article.

11. (New) The method according to claim 10, wherein step (e) comprises spacing said inner male mold element apart from said outer female mold element by means of a plurality of indexing elements, which engage said inner male mold element and said outer female mold element, and provide said prescribed spatial offset that forms geometry parameters of said unsealed mold cavity between said inner male mold element and said outer female mold element.

12. (New) The method according to claim 11, wherein step (e) comprises clamping said inner male mold element into a fixed position within said interior region of said outer female mold

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element, so as to retain said inner male mold element in a mold cavity-forming position.

13. (New) The method according to claim 10, further including the step of:

(g) removing a band of cured resin formed along an edge of said resin transfer molded article provided in step (e) as a result of resin outflow from said mold cavity into said channel.

14. (New) A method of manufacturing a resin transfer molded article comprising the steps of:

(a) providing a rigid outer female mold element having an interior surface associated with a first surface of said article;

(b) providing a rigid inner male mold element having an exterior surface associated with a second surface of said article, and being sized to be placed within an interior region of said outer female mold element, so as to define a mold assembly forming an unsealed mold cavity between said interior surface of said outer female mold element and said exterior surface of said inner male mold element, said inner male mold element having a perimeter sidewall that is adapted to extend a vertical distance alongside, but spaced apart from, a mutually facing interior sidewall of said outer female mold element when said inner male mold is inserted into said outer female mold, such that said inner mold element is not sealed against said outer female mold element;

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(c) placing a structural preform within said interior region of said outer female mold element;

(d) introducing a volume of liquid resin into said interior region of said female mold element, thereby wicking fibers of said structural preform and producing a resin-impregnated preform, said volume of liquid resin being larger than the volume of said unsealed mold cavity defined between said outer female mold element and said inner mold element when inserted into said outer female mold element;

(e) providing a plurality of indexing elements, which engage said inner male mold element and said outer female mold element, and provide a prescribed spatial offset that forms geometry parameters of an unsealed mold cavity between said inner male mold element and said outer female mold element;

(f) inserting said inner male mold element within said interior region of said outer female mold element, and performing only mandrel-based compression of said inner male mold element against said resin-impregnated preform produced at said interior region of said female mold element in step (d), while said indexing elements cause said inner male mold element to be spaced apart from said outer female mold element by said prescribed spatial offset that forms geometry parameters of said unsealed mold cavity, as well as a generally continuous narrow annular channel that is contiguous with said unsealed mold cavity, and through which air is vented and into which resin introduced in

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step (d) is allowed to expand from said mold cavity as a result of mandrel-compression of said inner male mold element against said resin-impregnated preform at said interior region of said female mold element;

(g) clamping said inner male mold element into a fixed position within said interior region of said outer female mold element, so as to retain said inner male mold element in a mold cavity-forming position, and allowing said resin to cure; and

(h) after curing said resin, removing said mold assembly and removing a band of cured resin formed along an edge of said resin transfer molded article as a result of resin outflow from said mold cavity into said channel to thereby form said resin transfer molded article.